NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD AND SPECIFICATIONS

TREE/SHRUB ESTABLISHMENT

(Acre)
CODE 612

DEFINITION

To establish woody plants by planting or seeding.

PURPOSE

This practice may be applied as part of a conservation system to support one or more of the following purposes:

- Establish woody plants for forest products.
- Provide erosion control.
- Improve energy conservation and beautification.
- Reduce water pollution through uptake of soil and water borne chemicals and nutrients.
- Beautify an area.
- Protect a watershed.
- Provide wildlife habitat.
- Control drifting snow.

CONDITIONS WHERE PRACTICE APPLIES

On any areas where woody plants are suited.

CRITERIA

General Criteria Applicable to All Purposes.

Species will be adapted to soil-site conditions.

Species will be suitable for the planned purpose.

Planting or seeding rates will be adequate to accomplish the planned purpose.

Planting dates and care in handling and planting of the seed or seedlings will ensure that planted materials have an acceptable rate of survival.

Only viable, high quality and adapted planting stock or seed will be used.

All planting stock and seed should be purchased from nurseries that are known to be using regionally adapted seed, seedlings, or cuttings.

Site preparation shall be sufficient for establishment and growth of selected species.

Adequate seed or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

Choose a planting method that is appropriate for existing site conditions and species capabilities.

Timing and use of equipment will be appropriate for the site and soil conditions.

The planting will be protected from adverse impacts such as livestock and wildlife damage and fire.

Additional Criteria for Reducing Water Pollution. Give preference to species that are native to the area.

If in a riparian area, use species adapted to local flooding conditions.

Additional Criteria for Wildlife Habitat. Use multiple native species where possible to accomplish the intended purpose.

Select species that best meet wildlife and ecosystem needs.

Additional Criteria to Provide Erosion Control. Plants should be evenly distributed over the planting site. Control erosion with mulches, plant residues, contour planting, or other appropriate measures.

Use non-competitive cover crops between planted rows on critical erosive slopes.

CONSIDERATIONS

Plans for landscape and beautification plantings should consider foliage color; color and season of flowering, fruit and limb drop, maintenance, and mature plant height.

Tree arrangement and spacing should allow for access lanes, as appropriate.

OPERATION AND MAINTENANCE

Competing vegetation will be controlled until the woody plants are established.

Check for insect and disease damage with regular inspections. Seek professional assistance for diagnosis and control measures.

Maintain firebreaks around all plantings as needed.

Replanting will be required when survival is inadequate to meet the purpose of the planting.

Residual chemical carryover should be considered prior to planting.

Trees and shrubs should be protected from fire, insects, disease, and animals until established.

The use of irrigation, mulching, geo-textile mats, tree shelters, and tree shades may be necessary to ensure adequate survival.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, and narrative statements in the conservation plan, or other acceptable documentation.

GENERAL SPECIFICATIONS

The following table can be used as a guide in choosing suitable planting stock or seed:

Site	Planting Stock
Open Fields	1,2,3,5
Understocked Woodland	1,2,5
Landscaping	1,2,3,4,5
Environmental	1,2,3,5

1 = Bare-root; 2 = Container grown; 3 = Cutting; 4 = Balled & burlap; 5 = Direct seeding

Bare-root: Plant large diameter seedlings with well-branched, fibrous root systems. Discard any diseased or damaged seedlings. For underplanting hardwoods, use stock at least 3/8 inch in stem diameter.

Container grown: Use healthy, well-developed plants. Discard any diseased or damaged material.

Included as container plants are potted, air root-pruned plants. These plants are developed through a multi-step program that produces a dense, fibrous root system creating a plant with improved survivability and accelerated growth characteristics.

Cuttings: Use cuttings prepared during the dormant season from wood of the previous season's growth. The cuttings should be taken from healthy, moderately vigorous stock plants growing in full sunlight. At least two nodes should be included in the cutting. The minimum size of cuttings should be 1/4 inch in diameter and 8 inches in length.

Balled and burlap: Use plant stock that is 18 inches or more in height for shrubs and 48 inches or more in height for trees. Do not use plants with cracked or broken rootballs. Avoid plants with root systems that are visible on the rootball surface and that circle the trunk.

Direct seeding: Use viable, mature seed.

Care of planting stock. Protect stock from desiccation during temporary storage and delivery to the planting site. Keep all types of planting stock, except the ones needed immediately for a supply during planting, stored in a cool environment (preferably < 50 degrees F) out of direct sunlight and wind.

Cuttings: If planting will be delayed, place cuttings in moist sand/paper, sphagnum moss, or plastic bags and store in a cool (34-40 degrees F) place.

Seedlings: Seedlings should be promptly examined in the shipping container and watered or re-wrapped in moist packing material. Survival can be increased by dipping roots in a commercial water-absorbing gel before planting or by soaking seedlings in water one to two hours before planting. If planting will be delayed for more than five days, keep seedlings in shipping container and place in cold storage at 35 to 45 degrees F.

Container grown: Container grown stock should be kept in its container and its soil kept moist (field capacity). Thoroughly water plants two days before planting. This will facilitate removal from containers during planting.

Direct seeding: Keep seeds cool. Maintain seed moisture content of 30-50 percent. Do not allow seed to mold. If seeds are field collected, place seeds in porous bags to prevent heat buildup. Keep seeds cool and stratify if necessary. For further information on direct seeding, refer to Iowa state University Forestry Extension Note F-363, Direct Seeding.

Balled and burlap: Keep the rootball moist by watering slowly from the top. Wet the foliage occasionally. Balled planting stock can be held temporarily by placing soil or mulch around the entire ball of the tree and keeping it moist.

Planting Dates. Use the following guidelines:

Bare root stock: March 15 to June 1 - Hardwoods and Conifers October 1 to frost in soil-Hardwoods only.

Cuttings: March 15 to June 1.

Plant as soon as possible after materials arrive, soak in water for 12 to 24 hours before planting. Plant cuttings within two days of collection or shipping arrival. Do not plant into frozen soil. Avoid planting on hot, windy days. A cool, cloudy day is preferred.

Balled and burlap and container grown stock can be planted any time of the year that the ground is not frozen.

Seed may be planted in fall or spring anytime that soil and site conditions allow (do not seed into frozen soil). Spring seeding may reduce rodent and insect damage. Fall seeding will eliminate the need for stratification. Acorns of most species in the white oak group have little or no dormancy and should be planted as soon as possible after collection in the fall.

Planting methods. Plant seedlings upright at the same depth or slightly deeper (one-inch) than the stock was growing in the nursery or container. Properly planted

seedlings should resist gentle lifting pressure.

Check each planted row for proper planting depth and root position and for adequate soil packing around the roots.

Plant cuttings leaving a single bud above ground.

Balled and burlap/containerized: Dig a hole large enough to hold root ball or container volume. Remove plants from containers before placing in the ground. If plants are in tarpaper pots, the tarpaper should be slit along each side or removed before placing in the ground. Place stock at same depth it grew at the nursery and firmly pack soil around roots to eliminate air pockets.

Direct seeding: Care must be taken to completely cover the seed and achieve good soil-seed contact. Plant seeds at a depth of two to three times the diameter of the seed, regardless of the method of planting. One or more of the following seeding methods should be used.

Broadcast: Broadcast the seed evenly over the planting area and cover seeds with mineral soil.

Strip: Broadcast the seed evenly over the prepared strips and cover with mineral soil.

Spot: Plant two to five seeds per spot. Seal planting hole.

Machine: Make sure seeds are covered with mineral soil.

Natural regeneration: The use of a natural seed source may be used under any of the following conditions:

- Areas that experience flooding that make plantings unlikely to succeed.
- Depression areas too wet to machine or hand plant.
- Sites likely to be invaded by soft-mast species that would likely out-compete planted hard mast species.
- Sites that are within 200 feet of existing mature woodlands and adjacent to desirable seed sources on two sides.

Planting Rates.

General wood products

Direct Seeding: For timber production, isolated sites and increased mast production use a minimum of 1500 seeds per planted acre. Higher seeding rates may be required to adequately 'capture' the site and limit competition from weeds.

Seedlings or Cuttings: Plant a minimum of 550 plants per acre for the following intended products and species:

sawlogs (hardwood)
sawlogs (conifer)
poles (conifer)
posts (hardwood)
biofuels

Christmas Trees.

Landowner equipment must be considered in the planting design/layout. Christmas trees should not be planted closer than six feet

Agroforestry.

Base plant spacing upon the type of agroforestry practice being developed. See Riparian Forest Buffer (391) for additional guidance.

Wildlife Habitat and Watershed Protection.

Use any of the minimum planting rates under General Wood Products. Shrub planting rates should reflect a minimum of 1089 plants per acre (5 x 8 spacing).

For wildlife habitat development or wetland restoration a minimum rate of 700 seeds per acre can be used, provided there is an adequate mature tree seed source of desired species within 200 feet on two sides. If a mature seed source is not close, use 1500 seeds per planted acre.

Erosion Control and Water Quality.

Direct Seeding: Use a minimum of 1500 seeds per planted acre.

Seedlings and cuttings: For hardwood trees, plant a minimum of 302 plants/acre; pines 807 plants/acre. For shrubs, plant a minimum of 1740 plants/acre.

For wind erosion, per acre planting rates will vary according to the extent of the planting and individual site plans. Base per acre rates on the following spacing:

Within the row spacing will be:

small shrubs (<10')	3-6 feet
large shrubs (>10')	5-8 feet
evergreens	6-20 feet
deciduous trees	8-20 feet

Between the row spacing will be:

between shrub rows	6-10
between tree rows	15-20 feet
between tree/shrub	15-20 feet

(allow for necessary machinery)

Energy Conservation, Snow Control, and Beautification.

Energy conservation and snow control: Base per acre rates on the following spacing:

Within the row spacing will be:

small shrubs (<10')	3-6 feet
large shrubs (>10')	5-8 feet
evergreens	6-20 feet
deciduous trees	8-20 feet

Between the row spacing will be:

between shrub rows	6-10
between tree rows	15-20 feet
between tree/shrub	15-20 feet

(allow for necessary machinery)

Beautification: Per acre planting rates will vary according to the extent of the planting and individual site plans.

Adapted Species. For species selection refer to Iowa Field Office Technical Guide, Section II-N, Trees and Shrubs for Windbreak and Environmental Plantings. Riparian Forest Buffer (391) and Windbreak/Shelterbelt Establishment (380).

Base selection on soil type, site limitations, landowner objectives, landscape characteristics, and geographic location.

Weed Control. Suppress weeds in a zone two to four feet around each plant or row until plants are established.

If herbicides are used, apply them only when needed and handle with care. Follow all label directions and precautions. If herbicides are not handled or applied properly, they may be injurious to humans, animals, fish, wildlife, desirable plants, and pollinating insects and may contaminate water supplies.

If mechanical means are used, care should be taken to avoid physical damage to plantings. Keep tillage depths shallow to avoid root damage.

If mulches are used, refer to Mulching (484).

REFERENCES

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Trees for Conservation: Planning, Planting and Care, CSFS No. 114, Colorado State Forest Service, 1985.

Plant Propagation Principles and Practices - Third Edition, Prentice-Hall, Inc., 1976.

Seeding and Planting Hardwoods in Central Hardwood Notes, USDA Forest Service, 1989.

Seeding and Planting Upland Oaks in Central Hardwood Notes, USDA Forest Service, 1989.

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Mechanical Tree Planting, UMC Guide 5009, University of Missouri - Columbia Extension Division, 1976.

Planting Trees for Farmstead Shelter, Extension Bulletin 196, University of Minnesota, 1980.

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Hardwood Nurseryman's Guide, USDA Agricultural Handbook No. 473, 1976.